

Measure

Good process decisions require comprehensive process data. We will determine indicators needed to evaluate current process performance as it relates to the Critical Customer Requirement (CCR) of Closing within 3.0 months from close of Sale.

Determine What to Measure

Leverage the Supply, Input, Process, Output, Customer (SIPOC) model, where inputs influence transition process which determines effectiveness, efficiency and quality of the outputs as delivered to the customer. Following indicators are critical to CCR performance.

Output Indicators

These are measures that evaluate dimensions of output, as it correlates to a 3.0 month sale to closing CCR. These easily collected and clearly defined indicators will contribute to driving corrective actions and provide insight into cause-and-effect relationships. Milestone attainment and change orders directly impact Buyer experience.

- a. Interval times for milestones (business days)
- b. Cost and schedule impact for each unit change order

Process Indicators

These are measures that evaluate effectiveness, efficiency and quality of process transformations necessary to convert inputs into Buyer-satisfying outputs and enable us to have an understanding of what is going on prior to delivery to the Buyer. Design selections and change orders contribute to closing scheduling.

- c. Design selection sign-offs – date and pass
- d. Number and type of change orders

Input Indicators

These are measures that evaluate degree to which inputs are consistent with what the process needs to effectively provide what the Buyer wants. Consistency of application of these indicators will contribute to effective design selection and reduce Sales efforts for each case.

- e. Interior Design Selection process guidelines, decision matrix and timeline
- f. Interior Design Selection information provided to Buyer (pictures, schematics, specifications, etc.)
- g. Instructions on getting access to design room
- h. Process cut-off dates (time-line)
- i. Procedure deliverable roadmap

Manage the Measurement

Operational definitions provide everybody the same meaning, ensures consistency in data collection and describes scope of the measure, building validity into the data the team gathers. Following Data Alignment table shows the alignment between information needs and the data to be collected.

Data Alignment

Data	Information need	Operational definition
a. Interval times for milestones (business days)	Where in the process are improvements to be focused?	1. Time stamps for milestones along path to unit delivery. 2. Verified milestone dates recorded
b. Cost, revenue and schedule impact for each unit change order	What impact does build-out phase change orders have on schedule and its cost / benefit?	1. Actual cost and schedule changes assigned to specified change order 2. Accumulate material, installation & admin. costs associated with change order. Document schedule changes to milestones.
c. Design selection sign-offs – date and pass	How does the design selection process and its feature categories perform to interval targets?	1. Actual intervals for complete sign-off and feature category performance. In addition, how many decision loops are required. 2. Time stamp dates recorded through the design selection process for each unit.
d. Number and type of build-out phase change orders	How many and in which feature categories are build-out phase change orders?	1. Document build-out change orders for each unit. Categorize by feature type. 2. As they are verified, record on the change order data collection sheet
e. Interior Design Selection process guidelines, decision matrix and timeline	Are Buyer's aware of the design selection process, impact to schedule, pre-requisites for sign-off and how decisions impact feature cost?	1. Verify (and how) key design selection process information was provided to Buyer. 2. Document conveyance to Buyer on data pack cover sheet.
f. Interior Design Selection information provided to Buyer (pictures, schematics, specifications, etc.)	Do Buyer's have access to comprehensive information to make sign-off decisions?	1. Provide instructions and material needs to facilitate Buyer design selections. 2. Document completion and method used.
g. Instructions on getting access to design room	Do Buyer's know how to acquire information needed to make sign-off decisions?	1. Provide instructions to Buyer on how to acquire needed reference during design selection process. 2. Document completion and method used.
h. Process cut-off dates (time-line)	Does the Buyer receive complete and accurate timelines for key milestones?	1. Provide Buyer with detailed timelines for key deliverable dates 2. Document timeline form completion & handover.
i. Procedure deliverable roadmap	Does the Buyer receive complete and accurate procedures to be completed and what is required?	1. Handover form to Buyer with definitions & process deliverables. 2. Document form completion & handover.

Measurement Plan for Unit Delivery Cycle

Performance Measure	Operational Definition	Data Source & Location	Sample Size	Who will collect data	When will data be collected	How will data be collected
a. Interval times for milestones	1. Time stamps for milestones 2. Verified dates recorded as unit progresses	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 3</i>) per unit
b. Cost, revenue and schedule impact for each unit change order	1. Actual cost and schedule changes assigned to specified change order 2. Document costs & schedule changes	NWS Far NWS	75	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 5</i>) per unit
c. Design selection sign-offs – date and pass	1. Intervals and pass loops for design sign-offs 2. Record sign-off dates	NWS Far NWS	1000	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit
d. Number and type of build-out phase change orders	1. Document build-out change orders for each unit. Categorize by feature type. 2. Record verified date & type.	NWS Far NWS	75	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 5</i>) per unit
e. Interior Design Selection process guidelines, decision matrix and timeline	1. Key info. provided about design selection process 2. Record complete & method	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit
f. Interior Design Selection information provided to Buyer	1. Provide instructions & material for design selections. 2. Document completion and method used.	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit
g. Instructions on getting access to design room	1. Provide instructions to on how to acquire needed reference during design selection process. 2. Document completion and method used.	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit
h. Process cut-off dates (time-line)	1. Provide detailed timelines for key deliverable dates 2. Document timeline form completion & handover.	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit
i. Procedure deliverable roadmap	1. Handover form with definitions & process deliverables. 2. Document form completion & handover.	NWS Far NWS	50	NWS Sales & Far NWS Sales	Oct. 8 to Nov. 2	Data collection sheet (<i>Figure 4</i>) per unit

Data will be used	Data will be displayed as
<ul style="list-style-type: none"> Identify process area to be improved Identification design selection feature issues Identify Sigma level Pareto Analysis to identify problem Root Cause Analysis 	<ul style="list-style-type: none"> Process Distribution Chart Data Summary Tables Pareto Charts

Data collection

Discrete performance and cause data will be collected and recorded in the data packet for each unit sold and deployed to Sales offices in the Northwest Suburbs and Far Northwest suburbs. Also, 'Data Alignment' chart and 'Measurement Plan' will be deployed for clarity and ensure consistency of data collection. Executive Team will collect the data packets weekly, for 4 weeks, and accumulate without analyzing. Anecdotal soft data will be gathered on Sales experiences and data collection process will be assessed, with corrective actions implemented, as needed.

Performance data (e.g. design selection time interval) will indicate how the process is performing and locate problem areas. Cause data (e.g. design selection feature category sign-off passes) will indicate why the process performs as it does and support problem solving by helping to isolate root causes.

Display Data

Data collection provided reliable, consistent, representative data upon which to base a process improvement analysis to proceed. A wealth of data was collected. For this report we isolated the critical data for assessing the problem, determining root cause and developing a solution. Data excluded (e.g. linking specific change orders to schedule impact) is valuable in further refining the build-out phase processes to squeeze the closing interval. We (Six Sigma Team) recommend assessing this data and tailoring data collection for your continuous improvement efforts.

The Sale to Closing period Process Distribution Chart, supports the Executive Team's 3.8 month interval documented prior to start of project. The chart shows a dramatic skew towards exceeding the target for Critical Customer Requirement (CCR) of Sale to Closing of a 3.0 month target. One-half of the units had Closing dates pushed-out by almost 2 weeks or more. A full 84% missed the target with an average 8.0 days missed for the 50 units.

The Contract to Design Selection period chart indicates the 20 day target for design selection sign-off interval is heavily skewed towards miss of the target. A full 47 of 50 units missed the target and 70% almost missed by a week or more. As a matter of fact, average for the 50 units was 5.1 days over the target.

This cause data measurement, as shown in the data accumulation table, on design selection sign-offs by feature category indicates that many design selections were not signed-off by the end of the 2nd pass. If features are not signed-off by the 2nd pass, then most design selection periods are pushed-out. This cause data could be indicative of challenges to meeting Sale to Closing performance to target.

Build-out phase change order chart shows a mixture of performance and cause data on change order revenue, costs and schedule impact indicates a strong correlation between change orders and closing push-outs. High frequency change order types might indicate a causal relationship between design selection quality and change order.

Determine Variation

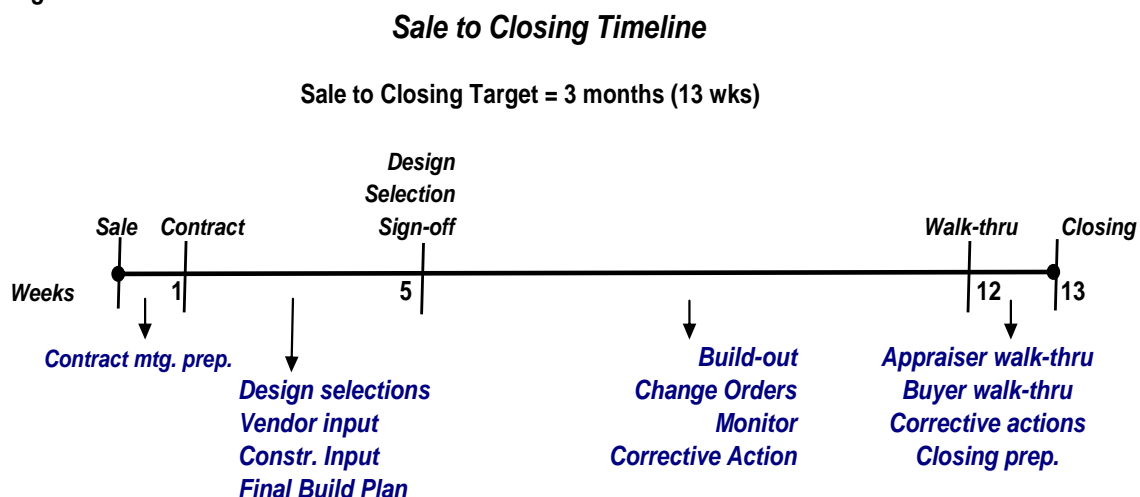
Variation means that a process does not produce exactly the same result every time. Assessing and reducing variability to meet Buyer requirements is central to Sigma Business Improvement. Two elements need to be measured;

- Customer Requirements
- Process performance

Build-out phase does not begin until all interior design selection feature categories are 100% signed-off. The Design Selection Frequency Distribution (or Voice of Process – VOP) chart shows the mean for all sign-offs is 3.75 weeks and the standard deviation (or average spread of this sample) is 1.61 weeks (1 Sigma). If the design selection process varies by 1.0 Sigma, then the 4 week target is exceeded by more than 1 week. This supports output indicator of 42 out of 50 units missing the Sale to Closing interval target.

Sigma performance (process yield) for design selections is 0.8 or 216K defects per million opportunities (DPMO). To attain the ‘Improved State’ goal of 3.0 Sigma, the mean has to be shifted to fewer weeks and variation has to be narrowed. As you can see from the timeline in (Figure 11), there is little room for error. If the design selection sign-off target of 4 weeks is not attained, then meeting the 3.0 month target for closing is tenuous at best. Heroic efforts in the build-out phase to squeeze that interval can be made, but may lead to quality issues.

Figure 11



So, although design selection sign-off interval is a process indicator, by extension it is strongly linked to the CCR output indicator of Sale to Closing interval.